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Canada's Role in Science and Technology for Development

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Editor

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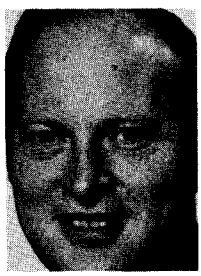
Science and Technology Policy in Developed and Developing Countries



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May I say what a pleasure it is to be back in Toronto after first arriving here 28 years ago to start work as a graduate student with Tuzo Wilson. The dominant theme that seems to be emerging from the hundreds of thousands of words of both talk and writing in preparation for the Vienna conference — a theme that was touched upon by both Guy Gresford and Jorge Sabato last night, a theme that seems to dominate the thinking of the developing countries' contributions to this preparation — is this tremendous determination and concern that the developing countries of the world achieve what they are calling science and technology self-reliance. I think it is important to understand that this phrase, science and technology self-reliance, is far more than rhetoric. It has an importance as rhetoric, but when one pierces that surface, one finds that there are specific guidelines for policymakers in the developing world.

The most important of these guidelines is that the first component of self-reliance is the determination to achieve the ability to make one's own decisions about all aspects of how science and technology are going to contribute to development. That, I think, is the foremost requirement of the Third World nations going to the Vienna conference.

The second component of self-reliance is a determination to have an ability to contribute some of the elements of technical knowledge that are going to be required in a nation to achieve this link between science and technology and development.

But it is the first aspect, this ability to make one's own decisions about all matters of science and technology, that I propose to address now. If there is a determination to have this ability, it means having the ability to make one's own science and technology policies and to implement them. Although I have been asked to address the topic of science policy, I am going to include technology policy because, after all, what has come to dominate the discussions about the United Nations conference and most discussions about science and technology in the Third World is: What can technology do for development?

To understand the current views of the Third World about science and technology policies, it is necessary to have a brief historical introduction to the topic. Science policy is really a product of the concerns of nations in the Organization for Economic Co-operation and Development (OECD) after World War II. There was the concern about how to use scientific research for economic growth, which led to the idea that nations need to have their own science policy to help them achieve their economic growth objectives. It was

Alexander King, in his role as Scientific Director of OECD, who played a major role in determining what scientific research might do to help economic growth. Much of the thinking at that time, in the 1950s, led to the idea that a science council should be established in most countries to design policies for scientific research relating to economic development. The science councils generally had eminent scientists as their members, with an occasional politician and sometimes somebody from the industrial community.

This is what seemed to be happening in the developed world toward the end of the 1950s and in the early 1960s when there emerged a concern in the Third World, articulated to quite an extent at the United Nations conference in 1963 in Geneva, as to what science and technology can do for us, how it can help us in our development. And it appeared that the developed world had provided an answer: they had established their science councils to design science policy. Perhaps the same thing should be done in the Third World.

The institution of similar science councils in the Third World was aided by such international organizations as UNESCO, OECD, and, to some extent, the Organization of American States. Later, in the 1960s, we saw a proliferation of science councils throughout the developing world. They were charged explicitly with establishing science policy as a link between science, technology, and development. But it didn't work.

I remember very clearly being at a meeting of the directors and secretaries general of the science councils of Latin America in Lima in 1971. They were meeting to discuss their experiences in designing science policy and contributing to development. The Secretary General of the Venezuelan science council at one of the informal sessions said:

> Look, I think we're in real difficulty. We have had a science council now in Venezuela for 5 years. We have a lot more money for science. There are more scientists; there are more scientific institutions. But I cannot honestly point to a single example where all of this additional investment in science has contributed one iota to what I would consider development. We formulate science policies, but nobody seems to take any notice of them; nobody implements them. Why?

The whole pattern of the meeting changed. Once the Venezuelan had broken the ice, all the others came forward and said that it was the same in their countries. When this was realized, the reasons were sought. Perhaps the difficulty was that they didn't know what policy instruments should be used to put into effect the policies they had been designing. Maybe the developed countries had a list of policy instruments that were useful to them. Maybe they should try to find out whether a study had been done that would tell them how to link policy with implementation. This gave rise to a study, of which Francisco Sagasti was the international coordinator: 10 countries, over a 2- or 3-year period, looked intensively in their own countries at the means that had been used or might be used to implement their science and technology policies to make them more relevant to the industrial needs of their societies.

It was this mood of frustration and disappointment about the contributions of science to development that led to the Science and Technology Policy Instruments (STPI) project and to a wave of other studies throughout the Third World — not just in Latin America but also in India and in many countries in Southeast Asia. As Jorge Sabato said yesterday, it was the knowledge resulting from this decade or more of studies carried out in Third World countries by Third World researchers that created the understanding that exists in these countries about

their science policy issues and that is being fed into the preparatory discussions for the Vienna conference.

In the short time I have, I would like to highlight what seems to me to be some of the more important conclusions that have arisen from this recent surge of studies related to science and technology policy. Some of the conclusions may seem pretty obvious to you now, but I can assure you that when they first surfaced they were far from obvious. They have come to influence decisions considerably, not only nationally but also internationally.

From the group of studies carried out in the Andean Pact countries, there emerged several things. Most important was the recognition that science and technology policies need to cover the full range of scientific and technical activities; the earlier emphasis on policies only for scientific research was misplaced because it left out the whole spectrum of other scientific and technical activities that are required for production. Also recognized was that investment in building up engineering design organizations or policies to help promote technical information services may be far more important in the early stages of industrialization than policies of research.

The second thing to come out of the Andean Pact studies was the recognition that the foreign investment in their countries was a combination of capital and technology, and that it was not sufficient to have policies to monitor and control the flow of capital alone. You have to have technology policies that cope with the investment of technology as well as the investment of capital. And the Andean Pact enunciated policies for exactly these purposes.

The STPI project showed strikingly in almost all the 10 countries in which the studies were carried out just how ineffective were the existing institutions for science and technology policy. They might have produced excellent science and technology plans, but the effectiveness of explicit policies for science and technology in affecting the decisions made by industrialists and entrepreneurs was limited. Far more effective in determining the technological decisions that were going to be made in enterprises were the policies enunciated in economic councils or by treasuries — fiscal policies, tax policies, and so on. This situation generated its own jargon in the terms "implicit" and "explicit" science and technology policies, a jargon that is now creeping into the preparations for the United Nations conference. To put it in a nutshell: technology policy is far more closely linked with economic policy than with science policy. There should be a shift in the whole policymaking structure within the Third World countries toward linking technology with economics far more closely than in the past and perhaps moving farther away from the link with science as established by the science councils.

A third general result of these studies — and from many others in the Third World — is the recognition that in acquiring foreign technology you just regard technology as a commodity. It is something that is bought and sold and negotiated for. You have to understand the rules of the game in this negotiation. They need to be made explicit not only for national policies but also for international policy. And the understanding gained by the Third World of the rules of the game in the past has been essential to them in their negotiations on the new code of conduct in the United Nations Conference on Trade and Development (UNCTAD).

The fourth main result of these studies is the recognition of the importance of the earlier emphasis on science and technology policies to stimulate the supply of knowledge. These policies needed to be complemented by policies that would affect the demand for knowledge, in particular the demand in local

enterprises for local technology so that the technology that was developed would be more appropriate than what could be imported. This need for explicit policies to affect demand is very important.

A fifth result, one really developed in the last couple of years by Máximo Halty-Carrère, who died about 3 months ago, at the culmination of the first phase of his project, was the recognition that there was a bridge between policy and implementation, a technology strategy. Halty-Carrère's studies of technology strategies had shown, surprisingly, that many of the components of a strategy of technology and industrialization are common to all countries, regardless of their political ideology, and depend almost entirely on a country's level of development and industrialization. Out of this he was developing some guidelines for strategies.

And, finally, point six: It has been disappointing to discover just how little knowledge has been generated on how to relate scientific investment and science and technology investment to problems of rural development. Almost all the studies have had to do with how to improve the modern sector. Very few useful guidelines have been produced on the link between science and the poverty of 80% of the population.

While all this work has been going on in developing countries, groups in the North have been looking at their own problems of science policy. And I think they have been coming to similar conclusions. First of all, they have come to recognize the diversity of goals for which science and technology must be used: initially the economy was the prime target, but now there is as much or more emphasis on health care, the environment, energy, resources, and employment. As in developing countries, analysts have concluded that technological policymaking needs to be located in the centres where decisions about all other activities are made.

And here we come more or less full circle to where we were in the 1950s, with the need to have a science policy because there is a danger of being left out with all the emphasis on technology.

In conclusion, I should like to underline what Jorge Sabato said yesterday about recognizing that we are just scratching the surface of our understanding of how science and technology can be used to help solve the problems of both the developed and the developing countries, the global problems, the international problems, the national problems. The need for further analysis and study so as to elucidate these issues is paramount.

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